

## ***Supplementary Material***

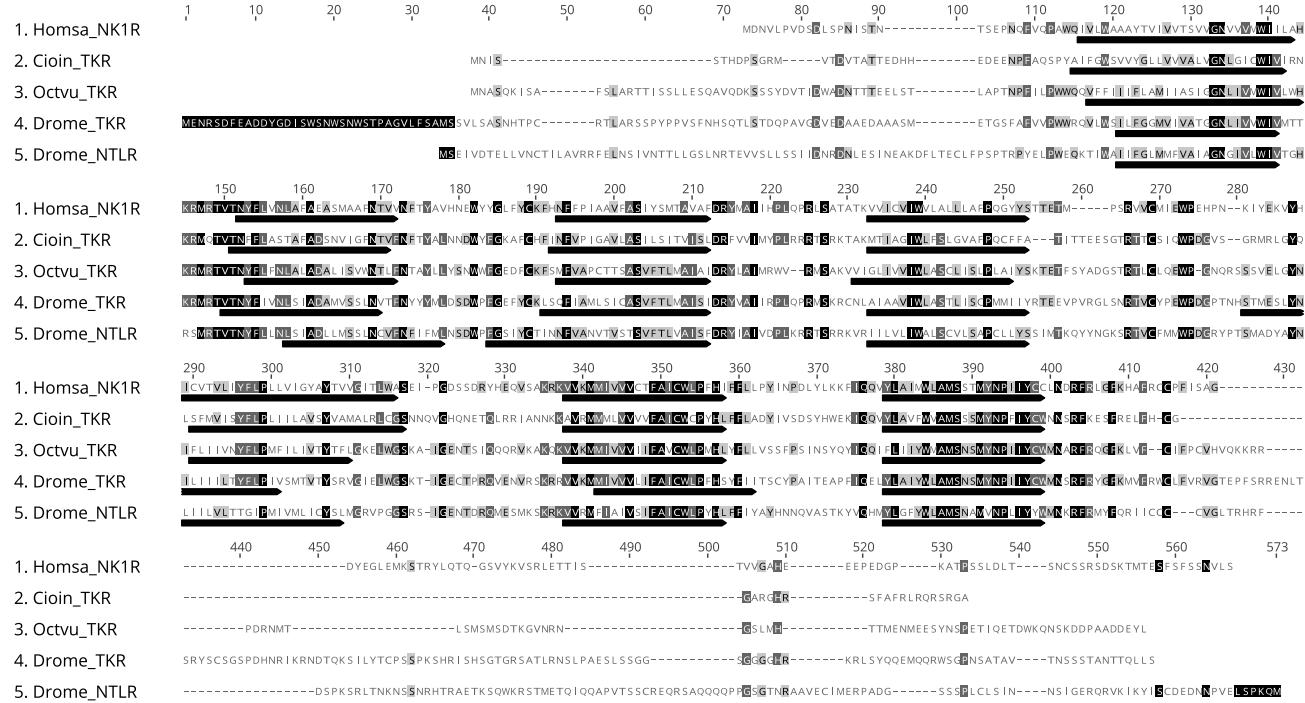
# Tachykinins: neuropeptides that are ancient, diverse, widespread and functionally pleiotropic

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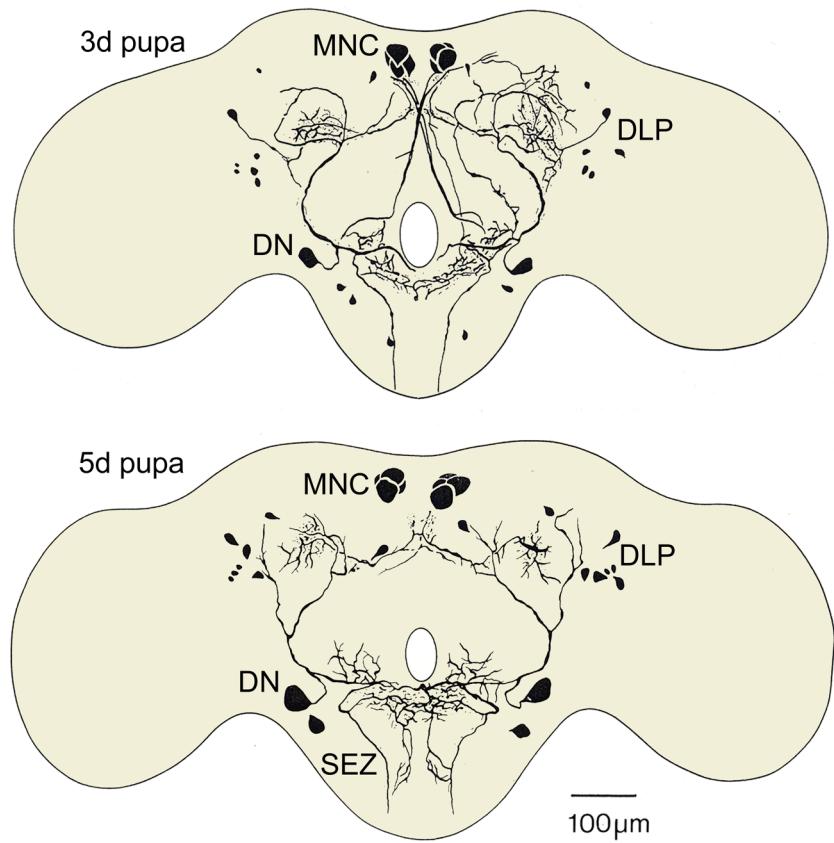
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## 1 Supplementary Figures and Tables

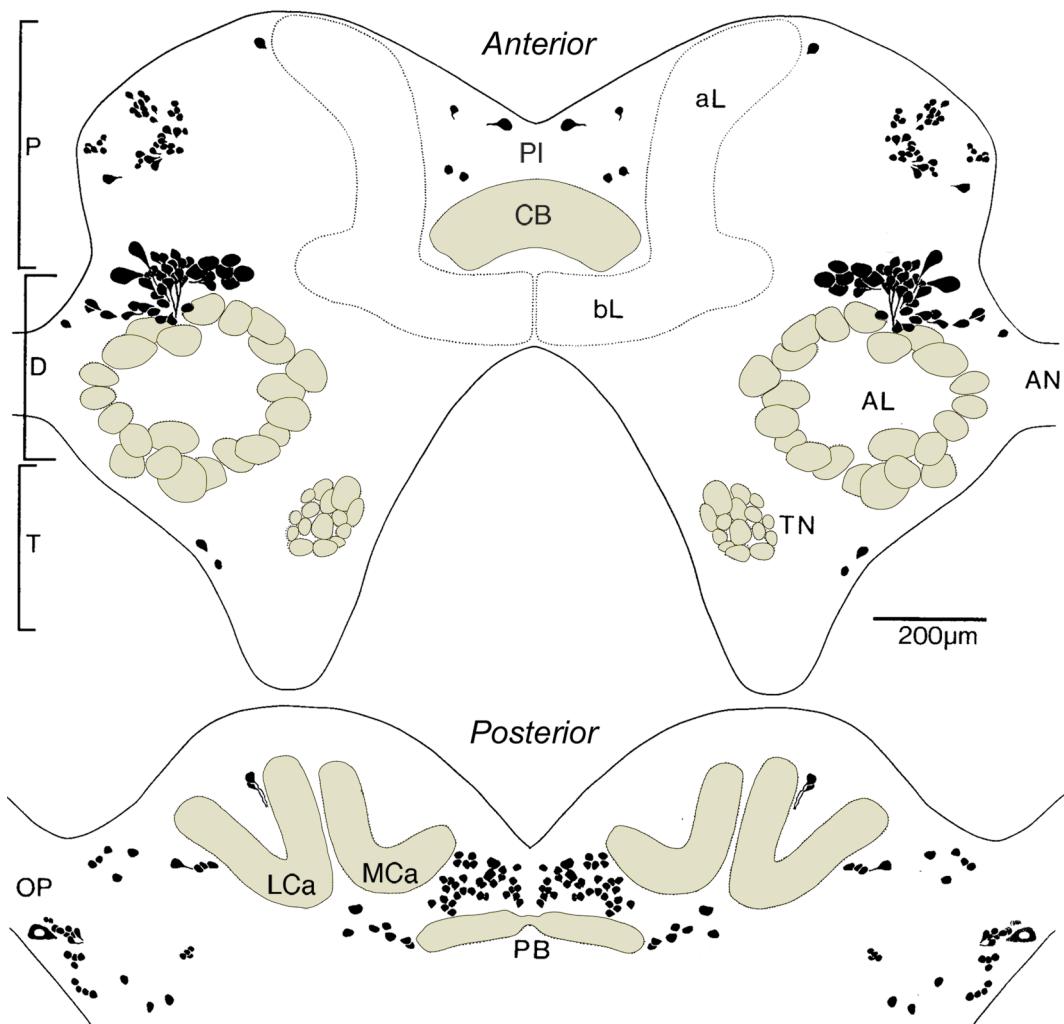
### 1.1 Supplementary Figures



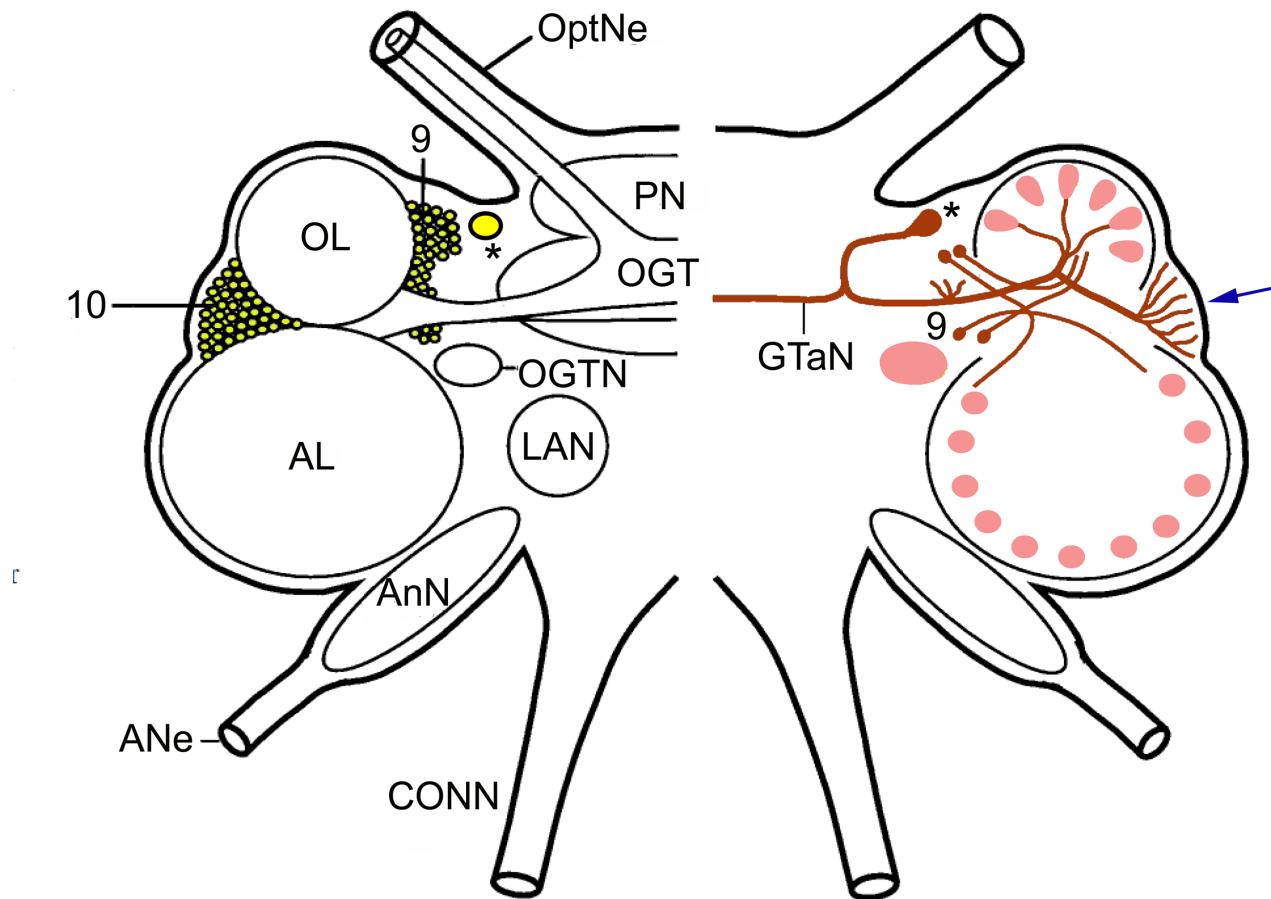
**Supplementary Figure 1.** Multiple sequence alignment of select TK and Natalisin receptor amino acid sequences. Transmembrane domains I-VII are indicated by black arrows. Conserved residues have been shaded according to the following scheme: 100% identical, black; 80% to 100%, dark grey; 60% to 80%, light grey; less than 60%, white. Abbreviations: Homsa, *Homo sapiens*; Cioin, *Ciona intestinalis*; Octvu, *Octopus vulgaris*; Drome, *Drosophila melanogaster*; TKR, Tachykinin receptor; NTLR, Natalisin receptor.



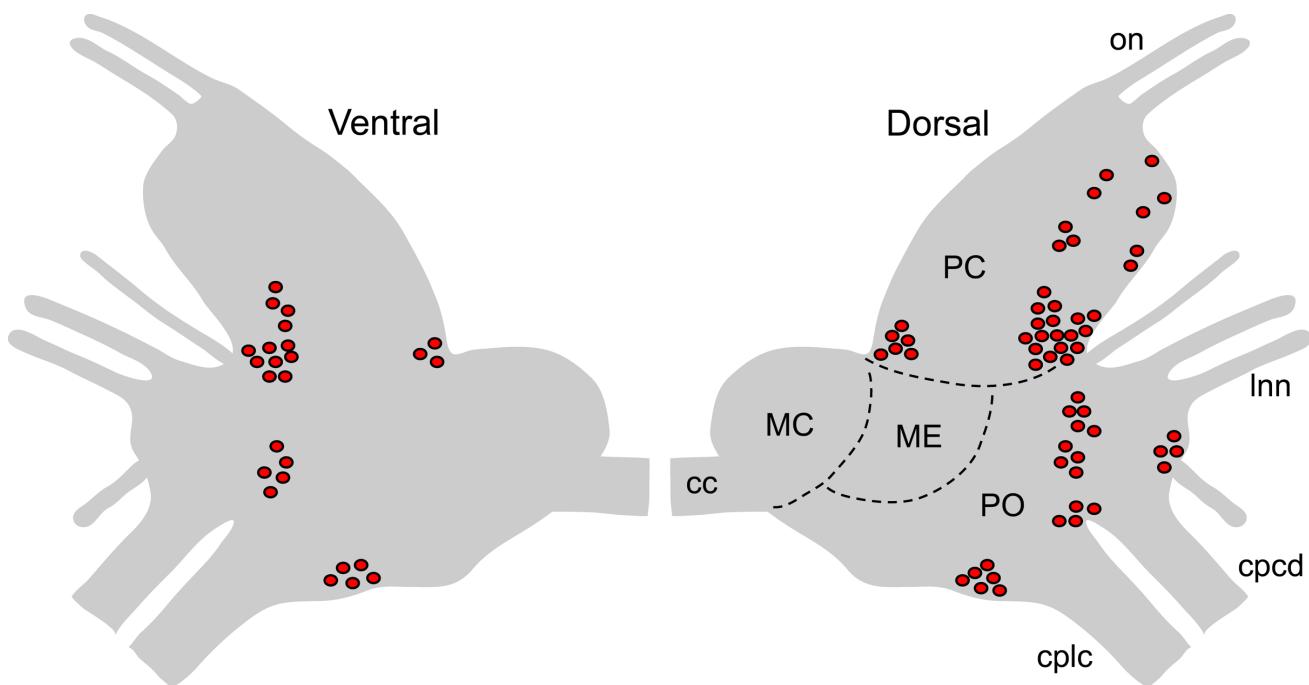
**Supplementary Figure 2.** TK immunoreactive neurons in the brain of the moth *Spodoptera litura*. The brains of 3 day and 5-day-old pupae are shown. The major TK neurons can be distinguished at this stage; only a smaller number of additional small neurons can be seen in the adult brain, especially in the subesophageal zone (SEG). A set of 8 median neurosecretory cells (MNC) expresses TK, and also a pair of descending neurons (DN). A bilateral cluster of TK neurons is also found in the dorsolateral protocerebrum (DLP). Image slightly altered from (Kim et al., 1998), with permission.



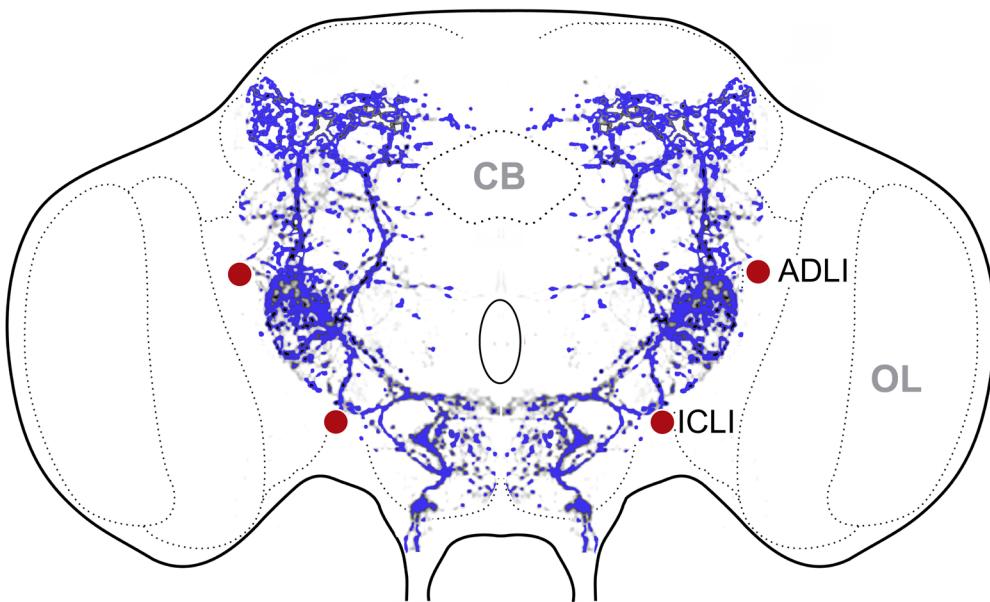
**Supplementary Figure 3.** TK immunoreactive neurons in the brain of the cockroach *Leucophaea maderae* (new name *Rhyparobia maderae*). Neuronal cell bodies are shown in black and neuropil regions innervated by TK processes are colored: central body (CB), antennal lobe (AL), tritocerebral neuropil (TN), calyces of the mushroom bodies (LCa and MCa) and the protocerebral bridge (PB). No labeling was detected in the alpha and beta lobes (aL and bL) of the mushroom bodies. However TK fibers are abundant in the pars intercerebralis (PI; not shown here). P, protocerebrum; D, deutocerebrum; T, tritocerebrum; AN, antennal nerve; OP, optic peduncle. Slightly modified from (Muren et al., 1995), with permission.



**Supplementary Figure 4.** Schematic depiction of TK immunoreactive neurons in the brain of the crayfish *Pacifastacus leniusculus* in horizontal view. In this figure only neurons associated with the olfactory midbrain are shown. This consists of the olfactory lobe (OL), accessory lobe (AL), lateral antennular neuropil (LAN), antennal neuropil (AnN) and the olfactory-globular tract (OGT). Cell clusters 9 and 10 are indicated (yellow). The TK expressing neuronal structures (red) and their arborizations in the OL and AL glomeruli (pink) and in cell cluster 10 are shown on the right side. The small olfactory-globular tract neuropil (OGTN) also contains immunoreactive fiber arborizations (pink to the right). One of the “giant TK-immunoreactive neurons” (GTaN) is shown schematically (cell body indicated by asterisk) and so are a few of the immunoreactive neurons of cluster 9. ANe, antennal nerve; CONN, connective; PN, protocerebral neuropils; OptNe, optic nerve connecting the brain with the eyestalk neuropils. Slightly altered from (Johansson et al., 1999), with permission.



**Supplementary Figure 5.** Schematic depiction of TK immunoreactive neurons in the cerebral ganglia of the snail *Helix pomatia* in horizontal view. Right side shows dorsal surface; left side ventral surface. Neuronal cell bodies are shown in red (note that accurate numbers are not shown). PC, procerebrum; MC, mesocerebrum; ME, metacerebrum; PO, postcerebrum; cc, cerebral commissure; on, olfactory nerve; Inn, lip nerves; cplc, cerebro-pleural connective; cpdc, cerebro-pedal connective. Slightly altered from (Elekes and Nässel, 1994), with permission.



**Supplementary Figure 6.** Semi-schematic depiction of natalisin (NTL) expressing neurons in the brain of *Drosophila*. Two pairs of NTL neurons were shown with a NTL-Gal4 driver and antiserum (red cell bodies and blue processes). These neurons were designated ADLI and ICLI. Note that the NTL process do not innervate any of the major structured neuropils, like the central body (CB), optic lobes (OL) or others not shown (mushroom bodies, antennal lobes and so on). The NTL processes were traced from an image in (Jiang et al., 2013) and superimposed on a brain outline.

## References to Figures

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## 2 Supplementary Tables

**Supplementary Material Table 1.** Tachykinin sequences from select invertebrates

Order	Species	Copies	Sequence / method	References
<b>Insects</b>				
Diptera	<i>Drosophila melanogaster</i>	6	Bioinformatics + MS	[1, 2]
	DTK-1		APTSSFIGMRa	
	DTK-2		APLAFTVGLRa	
	DTK-3		APTGFTGMRa	
	DTK-4		APVNSFVGMRa	
	DTK-5		APNGFLGMRa	
	DTK-6 <sup>1</sup>		pQRFADFNSKFVAVRa	
	<i>Calliphora vomitoria</i>	≥2	Chemical isolation	[3]
	CavTK-I		APTAFYGVRA	
	CavTK-II		GLGNNAFVGVRa	
	<i>Culex salinarius</i>	≥3	Chemical isolation	[4]
	CTK-I		APSGFMGMRa	
	CTK-II		APYGFITGMRa	
	CTK-III		APSGFFGMRa	
	<i>Aedes aegypti</i>	5	Bioinformatics + MS	[5]
	TKRP-1 and 4		APSGFLGLRa	
	TKRP-2		VPSGFTGMRa	
	TKRP-3		APSGFLGMRa	
	TKRP-5		VPNGFLGVRA	
Lepidoptera	<i>Bombyx mori</i>	5	Bioinformatics	[6]
	TK-1		IPQGFLGMRa	
	TK-2		APLGFITGVRA	
	TK-3		AANMHQFYGVRA	
	TK-4		PYDLSIRGKFIGVRA	
	TK-5		GQMGFFGMRa	
Coleoptera	<i>Tribolium castaneum</i>	8	Bioinformatics + MS	[7]
	TK-1		APSGFTGVRA	
	TK-2 x3		APSGFMGMRa	
	TK-3		APMGMFMGMRa	
	TK-4		APSGFFGMRa	
	TK-5		MPRQAGFFGMRa	
	TK-6		YPYQFRGKFVGVRA	
Hymenoptera	<i>Apis mellifera</i>	7	Cloning + MS	[8-10]
	AmTRP1		APTHQEMQa	
	AmTRP2		ALMGFQGVRA	
	AmTRP3		APMGFQGMRa	
	AmTRP4		APMGFYGTra	
	AmTRP5		ARMGFHGMRa	
	AmTRP6		SPFRYLGARa	
	AmTRP7		NPRWEFRGKFVGVRA	

Hymenoptera	<i>Nasonia vitripennis</i>	9	Bioinformatics + MS	[11, 12]
	TK-1		ASMRGFQGMRa	
	TK-2 x3		APMGFQGMRa	
	TK-3		AMMGGFQGMRa	
	TK-4		ALLGFHGMRa	
	TK-5		PMMMGFQGMRa	
	TK-6 <sup>1</sup>		SPYRFFGTRa	
	TK-7 <sup>1</sup>		NPRWEMRGKFVGVRA	
Hemiptera	<i>Rhodnius prolixus</i>	7	Bioinformatics + MS	[13, 14]
	Rhopr-TRP1		SGPGFMGVRA	
	Rhopr-TRP2		TSMGFQGVRA	
	Rhopr-TRP3		APASGFQGMRa	
	Rhopr-TRP4		TPSDGFMGMRa	
	Rhopr-TRP5		APACVGFQGMRa	
	Rhopr-TRP6		GPSSSAFFGMRa	
	Rhopr-TRP7		SPATMGFAGVRA	
	Rhopr-TRP8		pQERRAMGFVGMRa	
Hemiptera	<i>Cimex lectularius</i>	8	Bioinformatics + MS	[15]
	TKRP-1		pQERRQLGFLGVRA	
	TKRP-2		APTLGFQGLRa	
	TKRP-3		APPMGFQGVRA	
	TKRP-4		GPTMGFVGMRa	
	TKRP-5 x2		APASGFQGMRa	
	TKRP-6		GPSNAGFFGMRa	
	TKRP-7		GPSGFLGLRa	
	TKRP-PP1 + TKRP-2		DGTDEEFKRAPTLGFQGLRa	
Orthoptera	<i>Locusta migratoria</i> <sup>2</sup>	9	Chemical isolation + bioinf.	[16-18]
	Lom-TK-I		GPSGFYGVRA	
	Lom-TK-II		APLSGFYGVRA	
	Lom-TK-III		APQAGFYGVRA	
	Lom-TK-IV x 2		APSLGFHGVRA	
	Lom-TK-V		APMRGFQSVRA	
	Lom-TK-VI		ALKGFFGTRa	
	Lom-TK-VII		APSAGFHGVRA	
	Lom-TK-VIII		APVGFYGTra	
Blattodea	<i>Leucophaea maderae</i> <sup>2</sup>	15	Chemical isolation + cloning	[19-21]
	LemTRP-1 (or LemTKRP-1)		APSGFLGVRA	
	LemTRP-2		APEESPKRAPSGFLGVRA	
	LemTRP-3		NGERAPGSKKAPSGFLGTRa	
	LemTKRP-3 <sub>11-19</sub>		APSGFLGTRa	
	LemTRP-4		APSGFMGMRa	
	LemTRP-5		APAMGFQGVRA	
	LemTRP-6		APAAGFFGMRa	
	LemTRP-7		VPASGFQGMRa	
	LemTRP-8		GPSMGFQGMRa	
	LemTRP-9 x 2		APSMGFQGMRa	
	LemTRP-10		GPNMGFMGMRa	
	LemTRP-11		MGFMGMRa	

	LemTRP-12		GPSVGF FAMRa	
	LemTRP-13		APSAGFMGMRa	
Blattodea	<i>Periplaneta americana</i> <sup>3</sup>	15		[21, 22]
	PaTK1		APSGFLGVRA	
	PaTK2		APEESP KRAPSGFLGVRA	
	PaTK3		NGERAPASKKAPSGFLGTRa	
	PaTK4		APSGFLGTRa	
	PaTK5		APGSGFMGMRa	
	PaTK6		APAMGFQGVRA	
	PaTK7		APASGF FGMRa	
	PaTK8		VPASGF FGMRa	
	PaTK9		GPSMGFHGMRa	
	PaTK10		APSLGFQGMRa	
	PaTK11		APNMGFMGMRa	
	PaTK12		MGMGMRa	
	PaTK13		GPSVGFFAMR	
	PaTK14		APSAGFMGMRa	
	PaTK15		APSAGFHGMRa	
<b>Crustaceans</b>				
Decapoda	<i>Procambarus clarkii</i>	7	Cloning	[23]
	CabTRP-I x 7		APSGFLGMRa	
	<i>Cancer borealis</i>	≥1	Chemical isolation	[24]
	CabTRP-I		APSGFLGMRa	
	<i>Carcinus maenas</i>	4 <sup>4</sup>	Bioinformatics	
	CabTRP-I x 3		APSGFLGMRa	[25]
	CamTRP-2		TPSGFLGMRa	
Cladocera	<i>Daphnia pulex</i>	3	Bioinformatics + MS	[26]
	TRP1		TPNSRAFLGMRa	
	TRP2		KMHGEKFLGMRa	
	TRP3		APSSNSFMGMRa	
<b>Tick</b>				
Ixodida	<i>Ixodes scapularis</i>	4	Bioinformatics	[27-29]
	TKRP-1 x 2		AFHAMRa	
	TKRP-2		GSGFFGMRa	
	TKRP-3		MSRTPGKEHPRSTFVATRa	
<b>Scorpion</b>				
Scorpiones	<i>Mesobuthus martensii</i>	≥6	Bioinformatics	[30]
	TK-1		pQSDNVGR TDVFVGTRa	
	TK-2		NHYYHPEKS RSSAELIFIEAI DKDSNIYGEPIGFVATRa	
	TK-3 x 3		SDSAQEEPIGFVATRa	
	TK-4		SDSAQEEPIGFVGARa	
<b>Spiders</b>				
Araneae	<i>Stegodyphus mimosarum</i>	≥2	Bioinformatics	[30]

	TK-1		LGNTHSPFVFLSSRSKGPVN VHDPLAVLATGFMGSRa	
	TK-2		TDNNEIPVFANGFPAGRa	
<b>Tardigrade</b>				
Parachaela	<i>Hypsibius dujardini</i>	2 <sup>5</sup>	<b>Bioinformatics</b>	[31, 32]
	TK-1		AKPSGFWGARa	
	TK-2		APSSSGFFGMRa	
<b>Annelids</b>				
Hirudinida	<i>Hirudo medicinalis</i>	≥1	<b>Bioinformatics</b>	[33]
	TK-1		GPPMGFHFVRa	
Polychaeta	<i>Capitella teleta</i>	5	<b>Bioinformatics</b>	
	TK-1		LSRGFYAARa	[33]
	TK-2		FSPKSFHFSRa	
	TK-3		AYPSGFTMPRa	
	TK-4		VPLGFQMVRa	
	TK-5		GLNKSSFFLARa	
Polychaeta	<i>Platynereis dumerilii</i>	4 <sup>6</sup>	<b>Bioinformatics + MS</b>	[34]
	TK1-1 <sup>6</sup>		MDSNQFFHMRa	
	TK1-2		QPPKGFHAVRa	
	TK2-1		MDSNQFFHMRa	
	TK2-2		QPPQGFHAVRa	
Echiura	<i>Urechis unicinctus</i>	7	<b>Cloning + MS</b>	[35]
	Uru-TK-I		LRQSQFVGARa	
	Uru-TK-II		AAGMGFHGRa	
	Uru-TK-III		AAPSGFFGARa	
	Uru-TK-IV <sup>1</sup>		PRAAYSGFFGARa	
	Uru-TK-IV		AAYSGFFGARa	
	Uru-TK-V		APSMGFHGRa	
	Uru-TK-VI <sup>1</sup>		APHMRFYGSRa	
	Uru-TK-VII		APKMGFHGRa	
<b>Molluscs</b>				
Bivalvia	<i>Anodonta cygnea</i>	≥1	<b>Chemical isolation</b>	[36]
	Anc-TK		pEYGFHAVRa	
Bivalvia	<i>Patinopecten yessoensis</i>	7 <sup>7</sup>	<b>Bioinformatics + MS</b>	[37]
	TK-1		YGHALRa	
	TK-2		NYGHALRa	
Bivalvia	<i>Crassostrea gigas</i>	3		[38]
	Cragi-TK1		FGFAPMRa	
	Cragi-TK2		ARFFGLRa	
	Cragi-TK3		FRFTALRa	
Gastropoda	<i>Lottia gigantea</i>	4 <sup>8</sup>	<b>Bioinformatics</b>	[39]
	TK-1 (ProTK1)		pQRTFGFVGTRa	
	TK-2 (ProTK1)		pQPHLGFHGMRa	

	TK-3 (ProTK2)		HPNFGFMGSRa	
	TK-4 (ProTK2)		pQPAFGFHAVRa	
Octopoda	<i>Octopus vulgaris</i>	7	Cloning	[40]
	Oct-TKRP-I		VNPYSFQGTRa	
	Oct-TKRP-II		LNANSFMGSRa	
	Oct-TKRP-III		TVSANAFLGSRa	
	Oct-TKRP-IV		SDALAFVPTRa	
	Oct-TKRP-V		MNSLSFGPPKa	
	Oct-TKRP-VI		YSPLDFIGSRa	
	Oct-TKRP-VII		ASLHNTHFIPSRa	
Sepiidae	<i>Sepia officinalis</i>	9	Bioinformatics	[41]
	TK-1		FSPYAFQGSRa	
	TK-2		AHASLGFVGSRa	
	TK-3		pQPASLGFGVGSRa	
	TK-4		pQLNFIPSRa	
	TK-5		pQMSTAFVGSRa	
	TK-6		ISAEAFAPSRa	
	TK-7		LSSQAFFGSRa	
	TK-8		YSALGFMGSRa	
	TK-9		AAPFYHGFVASRa	
Nematode				
Rhabditida	<i>Caenorhabditis elegans</i>	7	Bioinformatics	[42]
	TK-1, 7		TPMQRSSMVRFa	
FLP-7	TK-2, 3, 4		SPMQRSSMVRFa	
	TK-5		SPMERSAMVRFa	
	TK-6		SPMDRSKMVRFa	
Echinoderm				
Forcipulatida	<i>Asterias rubens</i>	2		[43]
	ArTK1		QLWANQQSQLFa	
	ArTK2		GGGVPHVFQSGGIFa	
Tunicate				
Enterogona	<i>Ciona intestinalis</i>	2	Bioinformatics	[44]
	TK-1		HVRHFYGLMa	
	TK-2		ASFTGLMa	
Cnidaria				
Anthozoa	<i>Nematostella vectensis</i> <sup>9</sup>	10	Bioinformatics + MS	[45]
	TK-1		APPLDLSGPAYFHIRa	
	TK-2		GPPYIDLTEPSFFHIRa	
	TK-3		NPPIDLGPAYFHIRa	
	TK-4		pQPPIDLSPAAYFHIRa	
	TK-5		pQPPLDLGPAYFHIRa	
	TK-6		pQPPYLDLGEPSFFHIRa	
	TK-7		pQPPYLDLTPAYFHIRa	
	TK-8		pQPPYLDLTPSYFHIRa	
	TK-9		pQPPMIDLSEPAFFHIRa	
	TK-10		pQQPPMIDLSEPAFFHIRa	

**Notes:**

The C-terminal a in the sequences depicts alpha-amidation

<sup>1</sup> Not confirmed by mass spectrometry

<sup>2</sup> Numbering not in the order of that in the gene

<sup>3</sup> This version after [22], in reference [21] a slightly different annotation was provided.

<sup>4</sup> There are 2 preprohormones for TKs. One precursor encodes 2 copies of CabTRP-I and the other precursor encodes one copy each of the two peptides. Both the precursors are partially elucidated so there could be additional peptides.

<sup>5</sup> At least 1 peptide each on 2 precursors

<sup>6</sup> Two precursors

<sup>7</sup> Only two are real TK

<sup>8</sup> Two genes encoding TK precursors, each with 2 TKs.

<sup>9</sup> These are unlikely to be *bona fide* TKs

## References

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**Supplementary Table 2.** TKs identified in salivary and venom glands of invertebrates.

Species/peptide	Production site	Sequence	Reference
<i>Aedes aegypti</i>	Salivary gland		[1, 2]
Sialokinin I		NTGDKFYGLMa	
Sialokinin II		DTGDKFYGLMa	
<i>Octopus vulgaris</i>	Salivary gland		[3]
Oct-TK-I		KPPSSSEFIGLMa	
Oct-TK-II		KPPSSSEFVGLMa	
<i>Eledone moschata</i>	Salivary gland		[4]
Eledoisin		pEPSKDAFIGLMa	
<i>Ampulex compressa</i>	Venom gland		[5]
AcVTk1 x5		APMGFQGMRa	
AcVTk2		ALMGFQGMRa	
AcVTk3 x2		AVMGFQGMRa	
AcVTk4 <sup>1</sup>		DTDKRGPMGFQGMRa	

**Notes:**

The C-terminal a in the sequences depicts alpha-amidation

<sup>1</sup>Residues shown in italics may be cleaved off

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**Supplementary Table 3.** Representative frog TKs compared to human and fish TKs

Species <sup>1</sup>	Tissue <sup>2</sup>	Type	Amino acid sequence	References
<i>Homo sapiens</i>		SP	RPKPQQFFGLMa	[1, 2]
<i>Xenopus tropicalis</i>		SP-like	KPRPDQFYGLMa	NCBI search
<i>Theloderma kwangsiensis</i>	skin	SP-like	KPSPDRFYGLMa	[3]
<i>Kassina senegalensis</i>	skin	SP-like	DVPKSDQFVGLMa	[4]
<i>Kassina senegalensis</i>	skin	SP-like	DTPKSDQFIGLMa	[4]
<i>Homo sapiens</i>		NKA	HKTDSFVGLMa	[1, 2]
<i>Xenopus tropicalis</i>		NKA-like	YKSGSFFGLMa	NCBI search
<i>Homo sapiens</i>		NKB	DMHDFVGLMa	[1, 2]
<i>Rana ridibunda</i>	brain	NKB-like	DMHdffVGLMa	[5]
<i>Xenopus tropicalis</i>		NKB-like	EMNDDFFVGLMa	NCBI search
<i>Danio rerio</i>		NKF	YNNDI DYDSFVGLMa	[6]
<i>Xenopus tropicalis</i>		NKF-like	FYDDDSFVGLMa	NCBI search
<i>Physalaemus fuscumaculatus</i>	skin		pEADPNKFYGLMa	[7]
<i>Oddorana grahami</i>	skin		DDTEDLANKFIGLMa	[8]
<i>Oddorana grahami</i>	skin		DDASDRAKKFIGLMa	[8]
<i>Rana chensinensis</i>	skin		DDTSDRSNGFIGLMa	[9]

**Notes:**

The C-terminal a in the sequences depicts alpha-amidation

<sup>1</sup> Frog species shown with blue background<sup>2</sup> Tissue in frogs**References**

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**Supplementary Material Table 4.** Colocalization of TK or natalisin with neuropeptides and neurotransmitters in neurons and endocrine cells of *Drosophila* and *Locusta migratoria*<sup>1</sup>.

Tissue	Cell type	Substances <sup>2</sup>	Reference
<i>Drosophila melanogaster</i>			
Brain	ITPn (lateral neurosecretory cells)	ITP, sNPF, TK	[1]
Brain	LN (local neurons; antennal lobe)	TK, GABA <sup>4</sup>	[2]
Brain	LN (local neurons; antennal lobe)	TK, MIP	[3]
Brain	LN (local neurons; antennal lobe)	TK, Ast-A	[3]
Midgut	Endocrine cells	TK, NPF	[4]
Midgut	Endocrine cells, posterior	TK, DH31	[4]
Brain	ICLI (large natalisin interneurons)	NTL, AstA, MIP	[5]
<i>Locusta migratoria</i>			
Brain	Central complex	TK, LK	[6]
Brain	Central complex	TK, octopamine	[6]
Brain	Central complex	TK, GABA	[6]
Legs	Sensory neurons	TK, AT, FMRFamide, ACh	[7]
Midgut	Endocrine cells in midgut ampullae	TK, DH44, FMRFamide	[8]

#### Notes

<sup>1</sup> Using antisera and/or Gal4 lines

<sup>2</sup> Substances (in order of appearance in Table)

ITP, ion transport peptide

sNPF, short neuropeptide F

TK, tachykinin

GABA, gamma aminobutyric acid

MIP, myoinhibitory peptide

Ast-A, allatostatin A

NPF, neuropeptide F  
DH31, diuretic hormone 31

NTL, natalisin

LK, leucokinin

AT, allatotropin

ACh, acetylcholine

DH44, diuretic hormone 44

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**Supplementary Table 5.** Natalisin sequences from select arthropods

Order	Species	Copies	Sequence <sup>†</sup> / method	Reference
<b>Insects</b>				
Diptera	<i>Drosophila melanogaster</i>	5	Bioinformatics	[1]
	1		EKLFDGYQFGEDMSKENDPFIPPRa	
	2		HSGSLDDALMNRYEPFVPNRa	
	3		DKVKDLFKYDDLFYPRa	
	4		HRNLFQVDDPFFATRa	
	5		LQLRDLYNADDPFVPNRa	
	<i>Aedes aegypti</i>	8	Bioinformatics	[1]
	1		EILTHPSGGDIPLLDTQQHLRa	
	2		LPFYVDEPRYVVIA	
	3		PSLFQSNGGFSFIPQRa	
	4		ELSIQQMLQGSDFYFVPNRa	
	5		IKFDDILGSDELFIPNRa	
	6		ELFDLFFPAMTRa	
	7		ESDSGGELFYPTRa	
	8		NILENLAQSQDTFFFSSRa	
	<i>Anopheles gambiae</i>	6	Bioinformatics	[1]
	1		ESASPSEAETGa	
	2		GLPSPLVFMPARa	
	3		GDYFVPNRa	
	4		APTNNGELIKKa	
	5		FDVLLGGSPDEYFFFNRa	
	6		NLLENLANEHKDFFFSSRa	
Lepidoptera	<i>Bombyx mori</i>	11	Bioinformatics	[1]
	1		IHNEPPFWAIRa	
	2		IGLWNEPDIKHPANFWANRa	
	3		DLRQENDPFWGNRa	
	4		EEAFWSSKa	
	5		TEENPFWANRa	
	6		DSNTDVDPFWGSRa	
	7		SPGAGLNFWLNRa	
	8		SSEAEDDPFYISRa	
	9		YYLKYNFGRPa	
	10		SVRNDPYIARa	
	11		LAAQLQNDPYFASRa	
Coleoptera	<i>Tribolium castaneum</i>	2	Bioinformatics	[1]
	1		ASGQEEFGPFWANRa	
	2		DDNDINDNEPFYVTRa	
Hemiptera	<i>Rhodnius prolixus</i>	4	Bioinformatics	[1]
	1		AVLGSSSEAEPGFWPTRa	
	2		GDSSSTEEVQPPFWAHRa	
	3		DTMEQDPFWVSRa	
	4		ITVTNSFAGEMRGLWSLa	

<b>Crustaceans</b>				
Cladocera	<i>Daphnia pulex</i>	5	Bioinformatics	[1]
	1		GNTDQDMFWAARa	
	2		DGTFWAARa	
	3		YAADGGDGVPFWATRa	
	4		GDLEIPFWAARa	
	5		PASQAAEPFWAARa	
<b>Arachnids</b>				
Trombidiformes	<i>Tetranychus urticae</i>	2	Bioinformatics	[1]
	1		SAFNGMRa	
	2		ARPFAAMLa	
Parasitiformes	<i>Varroa destructor</i>	2	Bioinformatics	[2]
	1		SIGGPAPGFVGARa	
	2		GGVPGFVGARa	

**Note:**

<sup>1</sup> The C-terminal a in the sequences depicts alpha-amidation

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